



Potential Economic Loss Associated with the Introduction of Thousand Cankers Disease of Black Walnut into Iowa

Background

Since the 1990's black walnut has been dying in Western U.S. (CO, NM, AZ, UT, ID, CA and OR). The deaths are caused by a walnut twig beetle (*Pityophthorus juglandis*) that carries a fungus (the proposed scientific name is *Geosmithia morbida*) which is spread as the beetle tunnels through tree tissue. Beetles can reach very high populations and numerous cankers can develop. Instead of one large girdling canker, tree decline and death appears to result from the high number of cankers (causing the creation of the name Thousand Cankers Disease, TCD). Initial symptoms involve yellowing and thinning of the upper crown, which progresses to include death of progressively larger branches. During the final stages large areas of foliage may rapidly wilt.

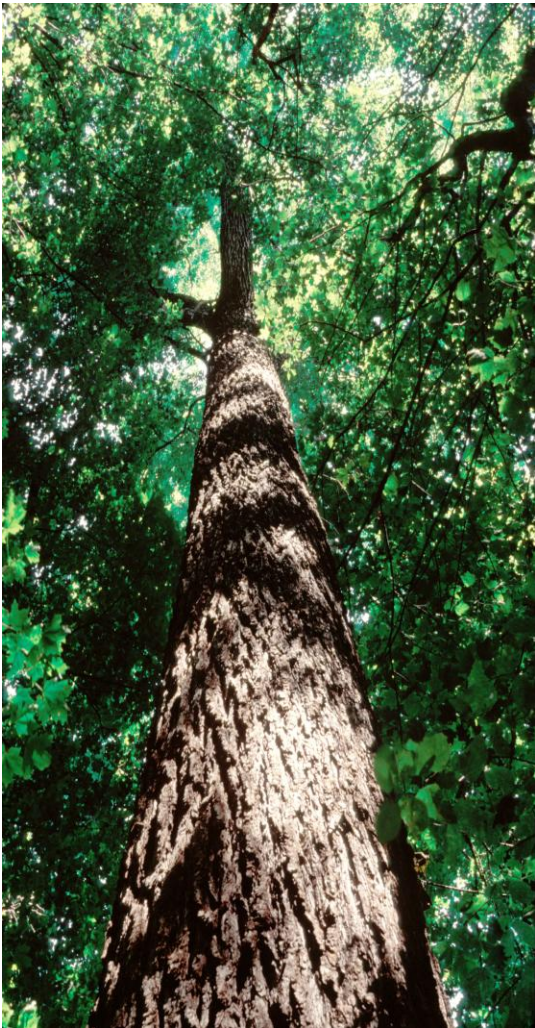


Image: Bruce Blair, IDNR

The disease complex has been discovered as close to Iowa as Rocky Ford, Colorado and most recently in Knoxville, TN. The introduction of TCD into Iowa could have disastrous effects economically and environmentally to the wood industry in the state and the rest of the nation. Iowa has the third largest volume (1 billion board feet) of sawlog size black walnut in the U.S. Some experts believe that TCD has the potential to decimate black walnut in the same way Dutch elm disease, emerald ash borer and chestnut blight have destroyed their respective hosts. In preparation for such a potentially devastating attack it is necessary to estimate potential economic losses to support policies and quarantines to slow and hopefully prevent the introduction of TCD to Iowa and the native range of black walnut.

Control

Controls for TCD have not yet been identified and their development will require better understanding of the biology of the walnut twig beetle and the fungus. Because of the extended period when adult beetles are active, insecticide spray applications will likely have limited effectiveness. Furthermore, colonization of the bark and cambium by the fungus may continue even if adult beetles or larvae are killed by the insecticide. Colonization will likely limit the ability of systemic insecticides to control transmission of the fungus to new hosts before substantial infection occurs. Rapid detection and removal of infected trees currently remains the primary means of managing TCD. Stopping or slowing its spread from infested areas relies on quarantines of wood products and public education.



Geosmithia canker on black walnut twig
Image: Ned Tisserat, Colorado State University, Bugwood.org

Wildlife

Black walnut has moderate importance to wildlife as a food source. Seeds are known to be eaten by woodpeckers, foxes, and squirrels.

Management Solution

Proper woodland and community tree management have a critical role in creating healthy trees. The best insurance a landowner can have when managing their woodlands is to maintain a diversity of tree species; while ensuring an appropriate number of trees are growing on each acre. The best management plan for communities is to create diversity by not having more than 10% of any one species represented. These simple management plans provide the best defense against emerging forest health threats.

Economic Impacts

Using existing data from Forest Inventory and Analysis plots, Timber Product Output surveys, and the most recent street tree inventories, we can estimate the potential economic impact of TCD in Iowa. The economic impacts of TCD would occur in four areas, 1) loss to the wood products industry as trees die, 2) loss to forest landowners with black walnut trees on their property, 3) loss to the nut industry, and 4) the loss to communities as street trees die.

The annual impact to the wood products industry includes foregone payments to landowners and loggers, and the lost value added at sawmills. In addition, these losses will lead to further effects throughout the economy, as landowners, loggers and mill operators have that much less economic stimulus not only in the direct community but eventually worldwide. (This “indirect” effect was calculated using IMPLAN¹ software, data and models.) These are annual losses that the Iowa economy would forgo in the future based on the amount of black walnut that is being harvested annually in Iowa.

¹ Minnesota IMPLAN Group uses classic input-output analysis in combination with regional specific social accounting matrices and multiplier models.

Annual Statewide Wood Products Loss

Annual Volume Harvested (bdft)	9,341,000	sawlogs ²
Estimated Economic Value to Landowners	\$28,023,000	Assuming \$3.00/ bdft revenue
Estimated Economic Value to Sawmills	\$28,023,000	Assuming \$3.00/ bdft revenue
Estimated Economic Value to Manufacturers	\$28,023,000	Assuming \$3.00/ bdft revenue
Indirect Economic Impact	\$11,078,100	1.223 based on IMPLAN 2012
Total Economic Impact	\$95,147,100	

Based on 2011 estimates, Iowa has 1 billion board feet of merchantable size black walnut growing in Iowa's 3 million acres of forest. The potential loss of income of this readily available material to Iowa forest landowners is summarized below. This is the estimated value of the black walnut resource that exists in Iowa today.

Statewide Landowner Value

Total Merchantable Volume (bdft)	1,000,000,000	sawlogs ³
Estimated Economic Value to Landowners	\$1,500,000,000	Assuming \$1.50/ bdft revenue

The annual impact to the nut industry includes foregone payments to nut gatherers, and the lost value added at the processor. Again, these losses will lead to further effects throughout the economy and are annual losses that the Iowa economy would forgo every year into the future. Over the last 9 years, Iowa nut producers have sold an average of over 200,000 pounds of walnut seed. In addition to seed for food sources, seed is purchased for reforestation efforts. Both of these markets are combined for the analysis in the chart below.

Annual Statewide Nut Production Loss

Annual Value Harvested ⁴	\$50,000
Indirect Economic Impact	\$25,000
Total Economic Impact	\$75,000

Tree canopy for Iowa communities averages 12%. Losses from affected urban trees include the cost of removing the tree, its "landscape value" and the cost of replacing it. Landscape value is a catch-all term that includes everything from a tree's aesthetic value to its impact on property values, pollution removed from the environment and utility costs. Losses from affected urban trees are not annual, but rather a one-time phenomena, although spread out over many years. These numbers assume residential trees on private property represent the same percentages for black walnut as is being documented during street tree inventories. Community street tree inventories do not take into account black walnut occurring in city parks and other urban areas or private residential areas. Communities and homeowners will bear the cost burden of removing dead trees caused by TCD.

² Miles, P.D. Forest Inventory EVALIDator web-application version 4.01 beta. St.Paul, MN:U.S. Department of Agriculture, Forest Service, Northern Research Station. December 13, 2012 <<http://fiatools.fs.fed.us/Evalidator/4/tmattribute.jsp>>

³ Miles, P.D. Forest Inventory EVALIDator web-application version 4.01 beta. St.Paul, MN:U.S. Department of Agriculture, Forest Service, Northern Research Station. December 13, 2012 <<http://fiatools.fs.fed.us/Evalidator/4/tmattribute.jsp>>

⁴ Personal communications with Hammons Products Company and State Forest Nursery.

Statewide Urban Street and Park Tree Loss

Number of Black Walnut Trees ⁵	1,014,000	
Removal Costs ⁶	\$507,000,000	\$500/ tree
Replacement Costs	\$152,100,000	\$150/ tree
Landscape Value ⁷	\$200,772,000	\$198/ tree annually
Total Economic Impact	\$859,872,000	

To determine the total economic impact to the wood products industry, annual industry losses are calculated in the table below using existing harvesting rates. Little is known about the spread of TCD and it is impossible to estimate when it will arrive in Iowa. (Indeed, since TCD symptoms may be invisible for several years, TCD may already be in Iowa.) Assuming that TCD arrives next year and that the losses are spread out over 20 years, we can estimate losses by determining the net present value (NPV) of each year's impact. NPV translates future dollars into today's dollars, using a discount rate. One way of thinking about NPV is to imagine paying for future losses by putting some money in the bank today. For example, putting \$100 in the bank today at a 5% interest rate could pay for a \$105 in damages next year.

Net Present Value Calculation of Loss of Black Walnut over the next 20 years in Woodlands; assuming 5% discount rate and indirect impact rate of 22%.

Year	Wood Products Industry (Future Dollars)	Present Value (2011 Dollars)
2011	\$ 3,323,430	\$ 3,330,930
2012	\$ 4,985,145	\$ 4,996,395
2013	\$ 6,646,860	\$ 6,661,860
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2028	\$ 31,572,585	\$ 31,643,835
2029	\$ 33,234,300	\$ 33,309,300
Total (during spread)		\$ 513,854,319
Years 2030 on (Total)	\$ 33,234,300	\$ 33,309,300
Total Present Value of the loss		\$547,163,619
Discount Rate		5%
Total Annualized Value of the Loss		\$43,905,824

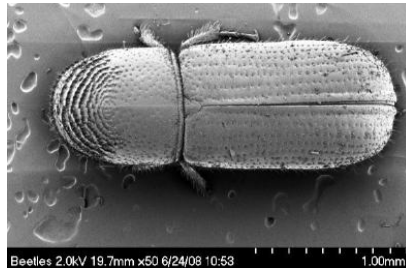
⁵ Iowa Community Forestry Tree Inventories, 23 communities, average number of street and park trees.

⁶ Average removal and stump grinding costs, communication with Iowa arboriculture industry.

⁷ Estimated using i-Tree STRATUM Analysis

Conclusion

Under these assumptions, the total impact of TCD to Iowa's wood products businesses is over **\$547 million** or an annualized loss of over **\$43 million** in 2011 dollars for now into perpetuity for the Iowa's economy. The result changes with the discount rate (for example, the total present value of losses go up if the discount rate goes down to the current Federal Funds rate target of 0.25%). Additionally, economic losses would be **\$75,000** for non-timber products like nut production and over **\$859 million** for community trees. If Iowa can delay, or even stop the spread of TCD – losses farther in the future are worth less today. **If you are experiencing declining black walnut trees on your property, contact your local district forester to assess the health of those trees.**



The twig beetle, (*Pityophthorus juglandis*), that carries *Geosmithia morbida*, is the tiny vector for TCD. Image: Ned Tisserat, Colorado State University, Bugwood.org

For additional information about TCD:

http://www.ksda.gov/plant_protection/content/350/cid/1615

http://mda.mo.gov/plants/pdf/tc_pathwayanalysis.pdf

<http://www.plantmanagementnetwork.org/php/elements/sum.aspx?id=8033&photo=4600>

<http://mda.mo.gov/plants/pests/thousandcankers.php>

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